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(54) IMPROVEMENTS IN OR RELATING TO THE HARDENING OF CLEAR OR PIGMENTED VARNISHES HAVING AN UNSATURATED POLYESTER OR POLYURETHANE RESIN BASE

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do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the hardening of clear or pigmented varnishes having an unsaturated polyester or polyurethane base, particularly for application to wood substrates, such as furniture.

It is already known to harden varnishes which are based upon unsaturated polyesters by using ultra-violet radiation. In the case of these varnishes, sometimes referred to as UV-polyester resins, the ultra-violet radiation triggers off a photochemical reaction by means of which the double bonds contained in the polyester resin and monomers, are broken with the formation of radicals. The hardening time is dependent upon the film thickness and the radiation intensity.

By the use of this known method, it is only possible however, to treat colourless polyesters. Hitherto, in the field of pigmented polyester varnishes, hardening by ultra-violet radiation has been out of the question because pigments reflect the radiation. Colourless polyester varnishes hardened in this way also exhibit a tendency towards yellowing, especially when applied to light woods and light decorative sheeting. The field of application of this known method of hardening using ultra-violet radiation is therefore restricted.

Attempts have already been made to harden similar polyester varnishes by means of long-wave infra-red radiation (black body radiation). This method of hardening is particularly suitable for use when the drawbacks previously referred to involved in hardening using ultra-violet radiation cannot be accepted. The hardening time when using long-wave radiation is long, however, and thus requires considerably long conveyor systems and drier ducts.

It is an object of the present invention to provide a method of hardening clear and pigmented varnishes and other coating compositions having an unsaturated polyester or polyurethane basis by the use of which more rapid hardening is possible than when long-wave infra-red radiation is used.

According to the invention, there is provided a method of hardening a clear or pigmented varnish having an unsaturated polyester or polyurethane resin base comprising the step of exposing the varnish or paint layer, after application, to infra-red radiation in the short to medium wavelength range (as hereinafter defined) for a period of not more than one minute.

The term "short to medium wavelength range" as used herein is intended to mean radiation of wavelength 1 to 3.6 μ.

It has surprisingly been found that infra-red radiation in the short to medium wavelength range does not give rise to destruction or damage to the coated and irradiated material.

Hardening using short or medium wavelength infra-red radiation in accordance

[Price 25p]

with the invention is completed in a space of one minute or less, depending upon the nature and thickness of the film. This means that the coated and hardened film can be subjected to a succeeding process immediately it leaves the hardening device used, the conveyor length of which in the radiation zone, need only be very short. There is no risk in this case that the coating will be damaged, so that it is possible, for example, to stack coated plates or panels directly on top of one another or to immediately turn round a plate or panel which has been coated on one side only and to treat its other side in accordance with the present invention.

It has been found particularly convenient to operate with infra-red radiation in the medium-wave range, by which is meant radiation of wavelength 2 to 3.6 μ.

In applying the method of the invention to the priming of chipboard panels, it has been found convenient to operate in the following manner: The chipboard panels coated during a first operation are hardened in a conventional manner using ultra-violet radiation, and are then coated in a second operation with a polyester primer, this film being hardened using infra-red radiation in the short to medium wavelength range.

By the use of such a combined operation, it is ensured that when coating UV-primed chipboard panels with pigmented polyester varnish hardened using infra-red radiation in the short and medium wavelength ranges, no collapsing phenomena are produced as a consequence of "working" of the chips or secondary hardening of the underlying polyester film.

The invention will now be further described with reference to drawing which is a schematic side view of apparatus for use in carrying out a method in accordance with the invention.

Referring to the drawing, a painting station 1 is shown in which an arriving panel is coated with a selected varnish having an unsaturated polyester or polyurethane base. From this painting station, the painted panel enters a ducted zone 5 the atmosphere in which is temperature-controlled in order not to exceed the prescribed explosion limit of 0.8% by volume of the varnish solvent vapour. Air is fed into this zone at 6, and discharged at 7. After passing through the ducted zone 5, hardening is carried out by infra-red radiators 4, the number, size, power and distance from the workpiece of which are selected in accordance with the varnish used.

A polyester clear or coloured varnish which can be hardened by the method of the invention, can, for example, comprise the following components:

a) unsaturated polyester resin;
b) one or more solvents, e.g. monomers or medium-boiling to low- boiling point esters;
c) one or more inhibitors, for example hydroquinone;
d) one or more accelerators, for example a heavy metal salt;
e) one or more fluidisers, e.g. silicone oils;
f) one or more de-lustering agents, for example highly dispersed silicic acid;
g) one or more hardeners in the form of organic peroxides;
h) one or more stabilisers, for example, cellulose acetobutyrate;
i) one or more pigments and fillers.

As already stated, the wavelength of the short to medium wavelength infra-red radiation used is between 1 and 3.6 μ, the short-wave band extending from 1.1 to 2 μ and the medium-wave range from 2 to 3.6 μ.

The panels are moved through the zone 5 and the radiator 4 by a conveyor 2, the whole device being enclosed by a casing 3.

WHAT WE CLAIM IS:—

1. A method of hardening a clear or pigmented varnish having an unsaturated polyester or polyurethane resin base comprising the step of exposing the varnish or paint layer, after application, to infra-red radiation in the short to medium wavelength range (as hereinbefore defined) for a period of not more than one minute.

2. A method as claimed in Claim 1, wherein said infra-red radiation is of medium wavelength (as hereinbefore defined).

3. A method of hardening clear or pigmented varnish substantially as hereinbefore described with reference to the drawing.

4. A method of priming a chipboard panel comprising the steps of applying a first coating of a primer having an unsaturated polyester base and hardening this coating using ultra-violet radiation, and thereafter applying a second coating of a primer having an unsaturated polyester base and hardened this second coating by means of infra-red radiation in the short to medium wavelength range (as hereinbefore defined) for a time not exceeding one minute.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*